

AperTO - Archivio Istituzionale Open Access dell'Università di Torino

Analysis of inorganic markers of stress in natural and genetically modified plants in the presence of chemical and physical stresses

This is the author's manuscript

Original Citation:

Availability:

This version is available <http://hdl.handle.net/2318/130010> since 2016-01-19T14:17:54Z

Publisher:

Società Chimica Italiana - Divisione Chimica Analitica

Terms of use:

Open Access

Anyone can freely access the full text of works made available as "Open Access". Works made available under a Creative Commons license can be used according to the terms and conditions of said license. Use of all other works requires consent of the right holder (author or publisher) if not exempted from copyright protection by the applicable law.

(Article begins on next page)

ANALYSIS OF INORGANIC MARKERS OF STRESS IN NATURAL AND GENETICALLY MODIFIED PLANTS IN THE PRESENCE OF CHEMICAL AND PHYSICAL STRESSES.

¹A.Giacomino, ²C. La Gioia, ²I. Zelano, ²D. Fabbri, ²M. Malandrino, ³R. Toniolo, ²O. Abollino

¹Dipartimento di Scienza e Tecnologia del Farmaco, Università di Torino

²Dipartimento di Chimica, Università di Torino

³Dipartimento di Scienze degli Alimenti, Università di Udine

The action of biotic and abiotic stresses on plants can induce within the plant the production of compounds able to contrast the effects of the attack. The knowledge of the response of the plants to unfavourable conditions can have useful effects in many fields (biological, environmental, agronomic), taking into account the climatic changes which occur in these last years. (1,2).

The plant that we considered is *Nicotiana langsdorffii* in its wild-type form and transgenic forms for the rat gluco-corticoid receptor gene (GR) and for the rolC gene from *Agrobacterium rhizogenes*. The plant was grown in controlled and reproducible conditions, with the aim of providing a well characterized reference sample and better detect the variations induced by stresses. The investigated plant samples were exposed to chemical (high concentration of chromium) and physical (dehydration) stresses, that give rise to the alteration of the cellular concentrations of a series of inorganic species. We studied such effects, monitoring the modification of a series of ions, such as the concentration of sodium and potassium cations, of nitrate and chloride anions, that are known to be markedly altered both by physical and chemical stress.(3)

The considered cations and some other elements (Al, Ba, Ca, Fe, Mg, Mn, P and Si) were determined using ICP-OES after acid digestion. Nitrates and chlorides were extracted into water and determined by ion chromatography; the results were compared with those obtained using ion ionoselective electrodes.

The obtained results were treated with multivariate chemometric techniques (Principal Component Analysis and Hierarchical Cluster Analysis) to identify correlations and similarities or dissimilarities among the the different considered markers.

(1) C. Poschenrieder, R. Tolra, J. Barcelò. Trends in Plant Science, 11 (2006) 288-295.

(2) N. Candan, L. Tarhan. Plant Science, 165 (2003) 769-776.

(3) M. Patra, N. Bhowmik, B. Bandopadhyay, A. Sharma. Environmental and Experimental Botany 52 (2004) 199-223.